

REMARKS

In the last Office Action, the Examiner objected to claim 4 as containing an informality. Claim 4 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,872,862 to Okubo et al. ("Okubo"). Claims 1-3 were rejected under 35 U.S.C. §103(a) as being unpatentable over Okubo in view of U.S. Patent No. 5,561,293 to Peng et al. ("Peng"). Additional art was cited of interest.

In accordance with the present response, the specification has been suitably revised to correct informalities, provide antecedent basis for the claim language and bring it into better conformance with U.S. practice. Original claims 1-4 have been replaced with new claims 5-24 to further patentably distinguish from the prior art of record, overcome the Examiner's objection, improve the wording, bring the claims into better conformance with U.S. practice, and to provide a fuller scope of coverage. A new abstract which more clearly reflects the invention to which the new claims are directed has been substituted for the original abstract.

In view of the foregoing, applicant submits that the objection to original claim 4 and the prior art rejections of original claims 1-4 have been rendered moot.

Applicant respectfully requests reconsideration of his application in light of the following discussion.

Brief Summary of Invention

The present invention is directed to a wafer pattern observation method and to a wafer pattern observation device.

In the manufacture of semiconductor devices, a conventional wafer pattern observation method is used to determine whether a wafer pattern contains defects. In this conventional method, observation points on the wafer pattern are determined in accordance with intuition and experience of the operator. In this regard, the operator manually aligns the observational field of view of a wafer pattern observation device and the necessary pattern observation is performed sequentially for each of the observation points.

However, the conventional wafer pattern observation device and method suffer from several drawbacks. First, in order to determine whether the wafer pattern has any defects, it is necessary to obtain a large number of control points, which requires a long period of time to accomplish. Furthermore, the determination of the control points rely primarily on the intuition and experience of the operator, which is highly likely to result in determination errors. Additionally, since the determination of the observation positions relies on a manual alignment operation, a long period of time is required for determining the observation positions, which lowers the overall working efficiency of the conventional wafer pattern observation device and method.

The present invention overcomes the drawbacks of the conventional art. Figs. 1-4 show embodiments of a wafer pattern observation method and a wafer pattern observation device according to the present invention embodied in the claims. According to the present invention, CAD data corresponding to a pattern formed on a wafer 4 is generated by a CAD device 51 and stored in a memory 6. An observation position designation section 8 determines a plurality of control points for the wafer pattern in accordance with an analysis of the CAD data. Coordinate data D is then acquired for the determined control points. A navigation unit 5 functions as positioning means for sequentially positioning an observational field of view of a pattern observation device 3 to observation positions on the wafer pattern in accordance with the acquired coordinate data D to obtain image data for the observation positions on the wafer pattern.

By determining control points for the wafer pattern in accordance with the CAD data corresponding to the wafer pattern, the required control points for the wafer pattern necessary for determining the presence of any defects in the wafer pattern are acquired in an accurate and efficient manner and within a short period of time as compared to the conventional art.

The prior art of record does not disclose or suggest the subject matter recited in newly added claims 5-24.

New independent claim 5 is directed to a wafer pattern observation method and requires the steps of providing CAD data corresponding to patterns formed on a wafer, determining a plurality of control points for the patterns formed on the wafer in accordance with an analysis of the CAD data, acquiring coordinate data for the determined control points, sequentially positioning an observational field of view of a pattern observation device to observation positions on the patterns in accordance with the acquired coordinate data to obtain image data for the observation positions on the patterns.

The prior art of record does not disclose or suggest the combination of steps recited in independent claim 5. For example, Okubo discloses an electron beam tester 210 which emits an electron beam toward a semiconductor chip 216 to be tested. Secondary electrons produced by the semiconductor chip 216 are detected by a detector 217. The detector 217 provides a detection signal to a SEM image receiver 218. CAD data corresponding to layout or pattern data of the semiconductor chip 216 is stored in an image storage unit 226. The pattern data stored in the image storage unit 226 are controlled by a computer 229 and displayed on a display unit

227. A pointing device 228 is used to specify a measuring or control point on the pattern displayed on the display unit 227.

However, Okubo does not disclose or suggest the step of determining a plurality of control points for the patterns formed on the wafer in accordance with an analysis of the CAD data, as recited in independent claim 5. In this regard, use of the pointing device 228 in Okubo to specify a control point on the pattern displayed on the display unit 227 does not correspond to a step of determining a control point for the pattern formed on the wafer in accordance with an analysis of CAD data, as recited in claim 5. Stated otherwise, in Okubo CAD data is controlled by the computer 229 for displaying the pattern on the display unit 227, not for the purpose of determining the control point. In contrast, claim 5 requires the step of determining a plurality of control points for the patterns formed on the wafer in accordance with an analysis of the CAD data.

Claims 6-11 depend on and contain all of the limitations of independent claim 5 and, therefore, distinguish from the prior art of record at least in the same manner as claim 5.

New independent claim 12 is directed to a wafer pattern observation device and requires determining means

for analyzing CAD data corresponding to patterns formed on a wafer and for determining a plurality of control points for the patterns in accordance with the analysis of the CAD data, means for acquiring coordinate data for the control points determined by the determining means, a pattern observation device for observing the patterns, and positioning means for automatically and sequentially positioning an observational field of view of the pattern observation device to observation positions on the patterns in accordance with acquired coordinate data to obtain image data for the observation positions on the patterns. No corresponding structural combination is disclosed or suggested by the prior art of record.

For example, Okubo does not disclose or suggest determination means for analyzing CAD data corresponding to patterns formed on a wafer and for determining a plurality of control points for the patterns in accordance with the analysis of the CAD data, as recited in claim 12. The CAD data disclosed by Okubo is not used or analyzed for the purpose of determining control points of the wafer pattern as set forth above for independent claim 5.

Claims 13-20 depend on and contain all of the limitations of independent claim 12 and, therefore, distinguish from the prior art of record at least in the same manner as claim 12.

New independent claim 21 is directed to wafer pattern observation method and requires the steps of acquiring pattern data corresponding to a pattern formed on a wafer and determining a plurality of control points for the wafer pattern in accordance with an analysis of the acquired pattern data. No corresponding steps are disclosed or suggested by the prior art of record as set forth above for independent claim 5.

Claims 22-24 depend on and contain all of the limitations of independent claim 21 and, therefore, distinguish from the prior art of record at least in the same manner as claim 21.

In view of the foregoing amendments and discussion,
the application is believed to be in allowable form.
Accordingly, favorable reconsideration and allowance of the
claims are most respectfully requested.

Respectfully submitted,

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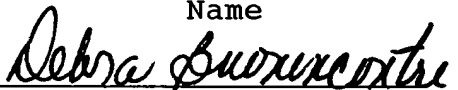
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